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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/716,316	11/17/2003	Xiaochun Nie	APLE.P0036	5248

62224 7590 05/29/2009

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EXAMINER	
WERNER, DAVID N	

ART UNIT	PAPER NUMBER
2621	

MAIL DATE	DELIVERY MODE
05/29/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/716,316	NIE ET AL.	
	Examiner	Art Unit	
	David N. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,15,16,20 and 22-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,15,16,20 and 22-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20090220*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action for U.S. Patent Application 10/716,316 is responsive to communications filed 27 February 2009, in reply to the interviews of 03 December 2008 and 12 February 2009, and the Non-Final Rejection of 12 September 2008. Currently, Claims 1, 15–16, and 20–27 are pending.

2. In the previous Office action, claims 8–14 and 17–18 were rejected under 35 U.S.C. 101 as non-statutory. Claims 1, 2, 8, and 9 were rejected under 35 U.S.C. 102(e) as anticipated by U.S. Patent 7,079,581 B2 (Noh et al.). Claims 5–7 and 12–14 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent 6,160,846 A (Chiang et al.). Claims 3, 4, 10, and 11 were rejected under 35 U.S.C. 103(a) as obvious over Noh et al. Claims 15–18 were rejected under 35 U.S.C. 103(a) as obvious over Noh et al. in view of U.S. Patent 5,650,860 A (Uz). The specification was objected to for informalities. The amendment to the specification filed 13 January 2009 overcame the objection to the specification. The amendment to the claims files 27 January 2009 overcame the rejection of the claims under 35 U.S.C. 101.

Response to Arguments

3. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. As discussed in the interview of 12 February 2009, in Noh et al., relaxation value K is not determined from one of a plurality of different scaling relationships, but is instead determined from deviation parameter D

which is the divergence from a target bit rate and pre-determined limitation parameter L (column 8: lines 1–53). However, U.S. Patent 6,226,326 B1 (Mihara) teaches that it was known in the art to provide a plurality of buffer size thresholds or limits in a VBV buffer. When the thresholds of Mihara are applied as different values of limitation parameter L of Noh et al., these form the claimed plurality of different scaling relationships in claim 1.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1 and 22–27 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 7079,581 B2 (Noh et al.) in view of U.S. Patent 6,226,326 B1 (Mihara). Noh et al. teaches a variable-bit-rate (VBR) video encoder that models complexity based on motion vectors or mean absolute difference of the encoded frames. Regarding claim 1, Noh et al. teaches calculating quantization factor Q of present frame t using deviation parameter D, which is based on the ratio of current bit rate to target bit rate (column 8: lines 4–53). Deviation parameter D determines the variation of quantization adjustment parameter K, which in turn allows for variation in the quantization, or "scaling" factor (column 8: lines 48–60). K and D are dependent on target bit rate divergence r and limitation value L which represents a limit to the "safety

region" of bit rate to prevent buffer overflow or underflow (column 8: lines 10–53). The parameter K is limited to not exceed a predetermined upper limit L (column 10: lines 52–53). Then, the receipt of parameter L which determines the limit to which the scaling can be relaxed is a claimed receipt of a scaling relationship based on a relaxation level corresponding to a level of concern regarding optimal use of the decoder buffer, with a small value of L corresponding with a small allowance of relaxation and a large value of L corresponding with a large allowance of relaxation. Since target bit count R is directly dependent on the selection of quantization factor Q (column 5: lines 58–65), this scaling is a method of "scaling the bit budget". However Noh et al. only provides for a single value of L used to determine the scaling relaxation, whereas Mihara teaches the selection from a plurality of mapping relationships.

Mihara teaches a video coding system. Regarding claim 1, in Mihara several streams of video are multiplexed into one output bitstream for transmission. Accordingly, while an overall bitrate may be constant, an allowable bitrate for an individual stream is dynamically allocated (column 8: lines 37–55) according to the varying complexities of the streams. A bit rate for a stream determines the available space in a vbv for the stream. Figures 10–12 illustrate a reduction in vbv size from vbv_size(0) to vbv_size(2) as maximum bit rate is reduced from bit_rate(1) to bit_rate(2) (column 15: line 39–column 16: line 32). Then, the selection of a maximum vbv size in Mihara is analogous to the selection of limit L in Noh et al. The different values of vbv_size produce the claimed plurality of different scaling relationships. Then, the scaling of a picture in Noh et al. according to a maximum allowed vbv capacity is the

claimed scaling the bit budget based on a decoder buffer usage, and the actual encoding with the components shown in figure 1 of Noh et al. (column 3: lines 4–39) is the claimed step of encoding the digital video picture by using the scaled bit budget. The determination of the parameters occurs in VBR controller 50 (column 3: lines 18–23, 40–41) which is the claimed "rate controller".

Noh et al. teaches the claimed invention except for multiple scaling relaxation values. Mihara teaches that it was known to vary the limitation of vbv capacity. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to use the buffer size limit values of Mihara for the scaling limitation of Noh et al., since Mihara states in column 2: lines 48–63 that such a modification would enable a maximum bit rate to be changed during transmission.

Regarding claim 22, in Noh et al., as K increases, so does the variation allowed for quantization, as K does not exceed L (column 8: lines 51–53). Since the claimed scaling is a constraint or limitation on the quantization (column 8: lines 38–51), wherein a large allowable deviation from a high value of L results in a large allowed variation in quantization, this is the claimed inverse proportion between relaxation level and scaling.

Regarding claim 23, in Mihara, a scenario in which an entire vbv buffer is available, that is, when the allowed capacity is vbv_size(0), is the claimed non-scaling of a bit budget.

Regarding claim 24, in Mihara, if vbv_size is expressed as a normalized fraction or percentage of vbv_size(0), this is the claimed scaling of the relaxation level between 0 and 1.

Regarding claim 25, in Mihara, the vbv_size field is calculated as a proportion of a vbv capacity in a linear manner as the scale factor, or relaxation control, is defined in pages 22–25 of the specification, particularly page 24: lines 4–10. Then, the basing of a vbv_size field as relative to a completely available buffer in Mihara is considered mathematically equivalent to the claimed basing of a relaxation level as relative to a base relaxation value of 0.

Regarding claim 26, in Mihara, a limited vbv size value that is smaller than the actual vbv capacity is a claimed buffer anxiety level.

Regarding claim 27, in figures 10–12 of Mihara, vbv_size(2) representing a small available vbv capacity is the claimed first value for a relaxation level representing a high concern regarding optimal use of the decoder buffer, and vbv_size(0) representing the maximum available vbv capacity is the claimed second value.

6. Claims 15, 16, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noh et al. in view of Mihara, and in view of U.S. Patent 5,650,860 A (Uz). Independent Claim 15 is directed to an encoding method in which a final bit budget for a frame is determined form the scale value. In Noh et al., R is the number of bits to be allocated in a frame, originally based on the bit rate of the previous frame (column 5: lines 39–40), and so is the claimed "initial value for a bit budget for a current

frame". Quantization factor Q determined based on threshold values of buffer fullness (column 9: lines 1–7) is a claimed scale value based on the percentage of memory buffer space. VBR controller 50 (column 3: lines 18–23, 40–41) is the claimed "rate controller". The selection of an available vbv size in Mihara is the claimed step of receiving a relaxation control value, and the generation of Q based on this limitation in Noh et al. is the claimed determination of a scaling relationship. However, Noh et al. and Mihara do not disclose determining a "final bit budget".

Uz teaches an adaptive MPEG-2 rate control system using adaptive quantization. Regarding claim 15, in one embodiment of Uz, a two-pass encoding system is used. First, encoding is performed on a frame or macroblock using an initial bit budget BB, and then a deviation CE is determined based on the difference between the actual number of bits used and the bit budget (column 22: lines 32-39). The bit budget is then updated by adding a scaled version of deviation CE to the initial bit budget (column 22: lines 40-45), and the frame or macroblock is re-encoded in a second pass according to the updated bit budget (column 22: lines 46-63). Then, scaling constant δ_b that determines how much an updated bit budget is allowed to deviate, is the claimed "relaxation control value", and the updated bit budget is the claimed "final bit budget". The second pass of encoding in Uz is the claimed step of encoding a video frame "using the final bit budget".

Noh et al., in combination with Mihara, discloses the claimed invention except for encoding a frame based on an adjusted bit budget. Uz teaches that it was known to perform a two-pass encoding based on an updated bit budget. Therefore, it would have

been obvious to one having ordinary skill in the art at the time the present invention was made to modify the coder of Noh et al. to perform two-pass coding, as taught by Uz, since Uz states in column 22: lines 28-36 that such a modification would provide feedback to ensure smooth bitrate transition in case of a sudden large deviation between an expected number of bits in a frame and actual number of bits.

Regarding claim 16, in Mihara, if vbv_size is expressed as a normalized fraction or percentage of vbv_size(0), this is the claimed scaling of the relaxation level between 0 and 1.

Regarding claim 20, the claimed invention differs from Uz in that in the claimed invention, the bit budget adjustment is performed by multiplying a scaling factor to a bit budget, whereas in Uz the bit budget adjustment is performed by adding an adjustment term to the bit budget (column 22: line 58). However, it would have been an obvious matter of design choice to use a scaling multiplication operation rather than a scaling addition operation, since Applicant has not disclosed in page 23 of the specification that use of a scale "factor" rather than a scale "term" solves any stated problem or is for any particular purpose, and it appears that the invention would perform equally well using an addition rather than a multiplication.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,212,233 B1 (Alexandre et al.) teaches a variable-

rate controller in which the vbv size is not constant. U.S. Patent 6,347,117 B1 (Kato et al.) teaches an encoder in which minimum vbv fullness is set at different levels for I pictures, P pictures, and B pictures. U.S. Patent 6,535,251 B1 (Ribas-Corbera) teaches an encoder with soft limits on quantization. U.S. Patent Application Publication 2001/0031002 A1 (Hashimoto et al.) teaches an encoder in which four video streams share a common vbv. U.S. Patent Application Publication 2002/0001344 A1 (Morris et al.) teaches an encoding system in which vbv fullness is updated at the slice level rather than at the picture level. U.S. Patent Application Publication 2002/0067768 A1 (Hurst) teaches an encoder in which quantization is determined in a two-pass process to avoid vbv overflow.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. N. W./
Examiner, Art Unit 2621

/Dave Czekaj/
Primary Examiner, Art Unit 2621